New reactor concepts and new nuclear data needed to develop them

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Developments of new reactor designs for utilization of thorium, such as the Advanced Heavy Water Reactor, especially demand creation of new nuclear data for all the isotopes of thorium fuel cycle. Improved nuclear data are essential to support new initiatives such as the international project on innovative nuclear reactors and fuel cycles (INPRO) that aims to support the safe, sustainable, economic and proliferation-resistant use of nuclear technology to meet the global energy needs of the 21st century. The detailed pursuit of development of Generation IV nuclear energy systems that offer advantages in the areas of economics, safety, reliability and sustainability require significantly improved nuclear data. The development of Accelerator Driven Sub-critical Systems proposed by Carlo Rubbia and others require significant amount of new nuclear data in extended energy regions and improvement of the presently available nuclear data. The quality assurance in design and safety studies in nuclear energy in the next few decades and centuries require new and improved nuclear data with high accuracy and energy resolution. The paper presents, from the perspective of the author, an overview of some of the improvements in nuclear data required for a sound scientific basis of advanced nuclear systems. Also, from the perspective of benchmarking and integral validation of nuclear data, presented briefly is the status of thorium irradiations performed in PHWRs in India and new results of post-irradiation analyses available thus far.

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